

REMARKS

Claims 2-11, 14, 16-19, 21-45 and 47-49 are now pending in the application. Claims 19, 24, and 31-45 have previously been withdrawn from consideration. Independent Claims 48 and 49 have been amended to clarify and more particularly point out the subject matter of the present invention. Support for these amendments is found in Applicants' specification at page 3 lines 9-11; page 5 line 33 bridging page 6 line 13; page 12 lines 24-29; and Figures 1 – 3. Applicants request entry of these amendments. The Examiner is respectfully requested to reconsider and withdraw the rejection(s) in view of the amendments and remarks contained herein.

Examiner Interview

Applicants' representatives appreciated the opportunity to conduct a personal interview with the Examiner on April 19, 2005, and would like to thank the Examiner for the courtesies extended during which the rejections to the claims of the present invention over the claims of U.S. Patent No. 6,692,545 ('545 patent) to Gittleman, et al were discussed. Since the '545 patent is co-owned, an identity of ownership does not exist between the '545 patent and the present application. As such, a terminal disclaimer will not obviate the non-statutory obviousness-type double patenting rejection. Applicants proposed amendments to Claims 48 and 49, which the Examiner indicated appeared to be allowable in light of the rejections over the 6,692,545 patent. However, no agreement was reached, as the Examiner wished to further consider the art in light of the proposed amendments. In view of these discussions, Claims 48 and

49 have been amended, and Applicants respectfully request reconsideration and allowance of these claims and those that depend therefrom.

Double Patenting

Claims 2-7, 9-11, 14, 16-18, 21-23, 27-30 and 47-49 stand rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over Claims 1-34 of U.S. Patent No. 6,692,545 (hereinafter "the '545 patent"). This rejection is respectfully traversed. The claims of the present application are directed to a non-rotating shift reactor that includes a carbon monoxide adsorbent active to adsorb carbon monoxide at substantially ambient temperature and pressure conditions and to desorb carbon monoxide at normal shift reactor operating temperature and pressure conditions. Such features are recited in both independent Claims 48 and 49. As such, the principles of the present invention relate to removing carbon monoxide from a gas stream containing hydrogen and carbon monoxide by employing carbon monoxide adsorbents.

The claims of the '545 patent relate to combining a water gas shift reactor (WGS) with a pressure swing adsorber (PSA) into a single rotating vessel. The rotating PSA/WGS employs a carbon dioxide adsorbent to remove carbon dioxide inside the combined rotating vessel to drive the water gas shift reaction ($\text{CO} + \text{H}_2\text{O} \leftrightarrow \text{CO}_2 + \text{H}_2$) to the reactants by removing CO_2 product. As such, the independent claims in the '545 patent, Claims 1 and 21 recite limitations of a rotating vessel having both a water gas shift catalyst and a carbon dioxide adsorbent. The '545 patent does not disclose or suggest a non-rotating water gas shift reactor at all, because the claims recite and

invention is directed to a combined rotating reactor vessel integrating a water gas shift reaction and carbon dioxide adsorption. The '545 patent discloses a carbon monoxide adsorbent in the WGS/PSA rotating vessel for use during start-up conditions, but it does not does not disclose or suggest a non-rotating shift reactor having a carbon monoxide adsorbent, as is recited in Claim 49 of the present application. As such, Claim 49 and its dependent Claims 2-11, 14, 16-19, 29, and 47 are not rendered obvious in light of the '545 patent, either by itself or in combination with any other references.

Further, the '545 patent does not disclose or suggest providing a first and a second carbon monoxide adsorbent in two separate reactor vessels (*i.e.*, a non-rotating WGS and a rotating PSA). In one aspect, the claimed invention in Claim 48 relates to an upstream shift reactor followed by a downstream rotating pressure swing adsorber. As recited in Claim 48, the non-rotating water-gas shift reactor comprises a first carbon monoxide reactant and the rotating pressure swing adsorber (PSA) vessel comprises a second carbon monoxide adsorbent.

The '545 patent provides no motivation or suggestion to include a downstream reactor having a second carbon monoxide adsorbent into the system, such as that recited in Claim 48 because, because in the '545 patent, the rotating combined water gas shift/carbon dioxide adsorption vessel generates CO-free hydrogen for use in the fuel cell. See Col. 5 of the '545 patent, for example. Hence, there is no motivation or suggestion in the '545 patent to provide a second rotating PSA reactor having a carbon monoxide adsorbent downstream from the rotating WGS/PSA vessel. Accordingly, the '545 patent does not render Claim 48 or its dependent Claims 21-28 and 30 obvious, either by itself or in combination with other references.

Further, Applicants would like to note that the '545 patent and the present application were filed on the same day, so that the '545 patent's teachings were not publicly available and as such the '545 patent does not constitute prior art to the present patent application. Applicants respectfully submit that the Claims 2-7, 9-11, 14, 16-18, 21-23, 27-30 and 47-49 of the present application are patentably distinct and non-obvious over the '545 patent claims, and as such respectfully request reconsideration of the rejection and allowance of the claims.

Conclusion

It is believed that all of the stated grounds of rejection have been properly traversed, accommodated, or rendered moot. Applicants therefore respectfully request that the Examiner reconsider and withdraw all presently outstanding rejections. It is believed that a full and complete response has been made to the outstanding Office Action, and as such, the present application is in condition for allowance. Thus, prompt and favorable consideration of this amendment is respectfully requested. If the Examiner believes that personal communication will expedite prosecution of this application, the Examiner is invited to telephone the undersigned at (248) 641-1600.

Respectfully submitted,

Dated: April 25, 2005

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